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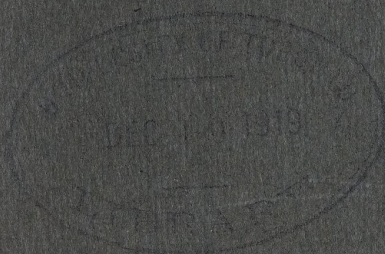
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Garbage as Feed for Hogs


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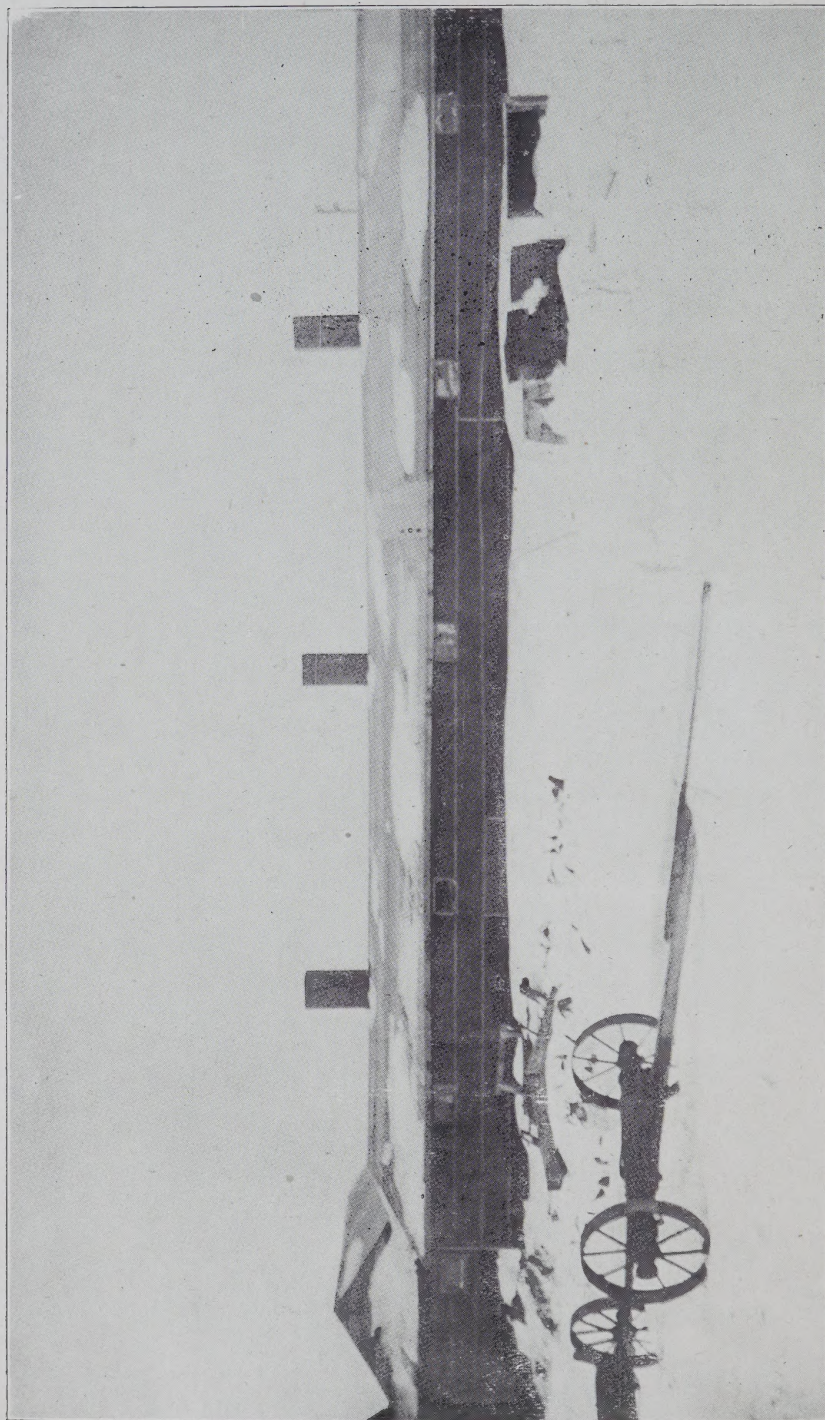


Commission of Conservation
Canada



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WING OF A GARBAGE FEEDING PLANT, SASKATOON, SASK.

There are two garbage feeding plants just outside the city limits. The boiling house can be seen at the extreme left. About 1,600 hogs were fattened and marketed during 1917.

*Canada. Conservation, Commission of.
" Committee on Lands.*

(COMMISSION OF CONSERVATION)
CANADA

Garbage as Feed for Hogs

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OTTAWA—1918

Commission of Conservation

*Constituted under "The Conservation Act," 8-9 Edward VII, Chap. 27, 1909, and
amending Acts, 9-10 Edward VII, Chap. 42, 1910, and 3-4 George V,
Chap. 12, 1913.*

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Assistant to Chairman, Deputy Head:

MR. JAMES WHITE.

Garbage as Feed for Hogs

THE feeding of garbage has met with varying degrees of success in a number of places in both Canada and the United States. In Canada, the feeding of garbage to swine is conducted under license and inspection. It must be sterilized before being fed. The method of sterilization employed is to thoroughly boil the garbage before feeding.

The following is Section 88 $\frac{3}{4}$ of The Animal Contagious Diseases Act:

"The feeding of swine upon garbage or swill, either raw or cooked, obtained elsewhere than on the premises where fed, is prohibited, unless special permission is first obtained from the Veterinary Director General."

Anyone contemplating feeding garbage other than their own kitchen and garden refuse should write to the Veterinary Director General, Ottawa, for full information regarding it.

Much of the most valuable garbage is already being used, as there are at present a number of licensed garbage feeders in the neighbourhood of many of the cities in Canada, who contract with the hotels, restaurants and larger boarding houses for their kitchen refuse.

Another point which must not be lost sight of is that the amount of garbage from cities and towns has recently been materially reduced by the practice of economy and the high cost of food-stuffs.

At Saskatoon, Sask. two men have built good piggeries and boiling rooms just outside the city limits. The city charges each man a \$25.00 permit fee and inspects the feeding premises twice a month.

Writing to the Commission of Conservation, regarding garbage feeding at Saskatoon, Arthur Wilson, Medical Health Officer, and W. H. Orme, City Veterinary Inspector, state that:

"There are from 500 to 800 hogs fed all the time and, during the past three months, there were over 400 hogs fattened upon boiled garbage mixed with a small amount of grain and sold from both places. A conservative estimate would at least be 1,600 hogs fattened and marketed during the year. This is quite an addition to the bacon supply for the year from one small city, and all from garbage formerly removed to the nuisance ground at the city's expense.

"In this city the feeding of boiled garbage to hogs according to our by-law has proven eminently successful and if this method were to be put into effect in every town and city in Canada (which could very easily be done) the hog production could be very greatly increased this summer."

During the summer of 1917, Professor G. E. Day, of Guelph, visited Worcester, Mass., and Grand Rapids, Mich, for the purpose of studying the garbage feeding operations conducted there and has kindly supplied the Commission of Conservation with the following notes regarding their methods of feeding, housing, breeding, etc.

FEEDING OF GARBAGE AT WORCESTER, MASS.

Worcester is a city of about 170,000 inhabitants.

The garbage is fed at the home farm, an institution for looking after the city's indigent poor. This farm contains about 600 acres, and is situated about three miles from the city.

At present the home farm is getting only about 60 per cent of the garbage, the remainder being handled by private individuals who have been granted licenses by the city. These private collectors are getting the best of the garbage, and the part most cheaply collected, because they take it from hotels, restaurants, and large boarding houses. The city council contemplates the handling of all garbage from the city, and further licenses to private individuals will likely be refused.

The garbage is drawn from the city to the farm by teams, each team making but one trip per day. At present, it requires 17 teams and 22 men to make the collections, and more will be needed in August. At present, (May 29th, 1917) they are collecting not much more than 15 tons per day. A falling off of about 40 per cent is noted in garbage, as compared with a few years ago.

The farm carries about 700 breeding sows, and a total number of pigs of about 3,000 of all ages. It is found more satisfactory to breed pigs than to buy them.

The herd was destroyed by foot-and-mouth disease in 1915, but cholera is prevented by immunization. At present, pigs are given serum treatment alone at six weeks old, and serum and virus at about three months old, or when they weigh about 40 pounds. Ordinarily, the simultaneous treatment at three months old is all that is given.

The garbage is fed raw, which is claimed to be the best way of handling it. At Denver, Colorado, a \$20,000 cooking plant was put in, but it has been thrown away.

Sows, young pigs, and fattening pigs are fed nothing but garbage, except that, just after farrowing, sows are sometimes given a little wheat middlings in water as a drink. This plan is not regarded as absolutely necessary.

The Superintendent, Mr. Thos. Horne, states that 15 tons of garbage per day maintain about 3,000 pigs of all ages.

Five hundred and fifty breeding sows were getting four tons of garbage per day, and were in first class condition.

Fattening hogs require 50 per cent more than sows.

According to this calculation, six tons per day would be sufficient for 550 fattening pigs, or one ton for 90 pigs.

This is nearly three times as high a valuation of garbage as was made by Messrs. Brown and Hartman, at Grand Rapids. The method of feeding may partly account for the discrepancy.

Most breeding sows have two litters per year, some farrowing in winter in steam heated pens.

The buildings for spring and fall litters are built of wood, single boarded, or clap-boarded. There is a six-feet feeding passage down the centre, and the pens on each side are twelve feet deep by six feet wide. Pens are floored with cement, and about half of each pen has a plank over-lay for the bed. The garbage is fed on the cement floor next to the feed passage, and there is also a cement trough for water.

The pens are cleaned every day.

The young pigs get no outdoor exercise.

At breeding time, 25 boars are turned in with 300 sows, the aim being to have a large number of sows farrow about the same time, so that young pigs may be castrated and immunized in large groups.

During the period of gestation, sows are given cheaply constructed sheds to sleep in, and are fed outdoors at all times of the year on wooden platforms.

The platforms are made of two-inch plank in sections, each section being eight feet square. They are built on runners so that they can be easily moved. Each section has a two-inch by four-inch scantling spiked across the top along each of the opposite sides. When the sections are placed side by side, these scantlings form a continuous ledge the whole length of the platform, which holds the garbage on the platform. Usually six sections make one large feeding platform.

Fattening hogs are fed on platforms the same as breeding sows, and their sleeping quarters are very cheaply constructed wooden buildings.

Platforms totalling eight feet by two hundred feet were counted, sufficient for 500 hogs.

Straw or shavings are used as bedding.

It requires about ten men to take care of the pigs, three of whom are kept busy cleaning pens and platforms, and drawing away manure.

Mr. Horne, the superintendent, is very enthusiastic and claims that, at present prices for hogs, garbage is worth at least \$10.00 per ton. He also claims that, under normal conditions, if he could get garbage laid down at the feeding grounds at \$1.00 per ton, he would guarantee 200 per cent return on capital. He also claims that garbage is a perfectly balanced food for pigs.

Springfield, Mass., has a modern reduction plant, but is changing over to hogs.

In 1914, the home farm sold \$38,000 worth of hogs. This year (1917) they will probably sell over \$50,000 worth, as well as increasing the stock.

FEEDING OF GARBAGE AT GRAND RAPIDS MICH.

Feeding hogs on garbage has been carried on for nine or ten years at Grand Rapids, a city of about 125,000. Mr. Alvah Brown was the first to undertake the enterprise, and was in the business between six and seven years, during which time he made a great deal of money. Following Mr. Brown, a company took over the business, outbidding Mr. Brown for the garbage. The city can enter into a contract for only three years, and, at the expiration of the three years, another company, in which Mr. Brown was evidently the prime mover, secured the contract from the city and commenced operations on January 1st of this year (1917). The contract with the city is drawn in the name of Mr. Henry Hartman, and a copy of this contract is attached.

The city has made certain rules defining what is meant by garbage, and the method which the householder is required to follow in his disposal of it, and a copy of these rules is attached hereto. It may be added that citizens are prohibited from disposing of garbage to any person or persons other than the city. The city collects the garbage by means of wagons equipped with covered steel tanks. The tanks are approximately ten feet long, four feet wide, and two feet deep. To collect the garbage, nine wagons and one auto truck are employed. One of these wagons makes three trips per day, and the other eight make two trips each. The auto truck, which carries two tanks, makes four trips in sixteen hours; that is to say, it works double time. Three of the wagons are drawn by single horses, and the other six by teams.

For transporting the garbage, 50-ton steel railway cars are used. The city owns four of these cars, and the company one car. It is estimated that, under prevailing conditions, these cars would cost at least \$1,600 each. For emptying tanks into the car, a hoisting device with a track running over the car makes it possible to empty the tanks very quickly and conveniently.

At present, the city is shipping three cars of garbage per week, and it is a significant fact, that a few years ago, they were shipping five cars per week. The difference, no doubt, represents the enforced economy in handling food owing to high prices.

The farm where the garbage is fed is located near Sullivan, about 30 miles from Grand Rapids, on the Grand Rapids and Indiana railway, and the freight rate on garbage from Grand Rapids to Sullivan, which, I understand, is a special rate, is 40 cents per ton. The farm consists of very poor sandy soil, in a thinly settled district. It is important to have a sandy soil in order to permit of ready drainage, and it is also important to be in a thinly settled district, so that there are fewer neighbours to complain of any odours which may arise. The company owns 160 acres, and, I am told, it has options on additional lands in the district.

The present stock on the farm comprises 300 cattle, 400 sheep, and 700 pigs, but there is not quite enough garbage to supply the requirements of all the stock on hand, and a certain amount of hay has been purchased for the cattle and sheep, though it is claimed the cattle and sheep prefer garbage to hay.

In the case of cattle, the manager prefers to buy very young cattle, even calves, about six months old. He claims that the young cattle become accustomed to the garbage more quickly and thrive upon it better than older cattle.

As to sheep, they do best when started upon garbage in the fall and gain in condition very rapidly during the winter. Ewes started on garbage early in the winter are producing strong lambs, but ewes, which were purchased this spring (1917) and started on garbage shortly before lambing, are not giving satisfactory results.

The cattle and sheep end of the business is more or less an experiment. The manager claims that cattle and sheep thrive best in the winter, especially the sheep. He claims that there is very little of the garbage that sheep will refuse, and in the winter time they will eat grape fruit and orange peel, which other animals will not touch. Under some conditions there are, no doubt, possibilities for using both cattle and sheep to advantage.

The feeding of hogs on garbage is an old established business, but it requires careful and efficient management to make it a success. One of the serious problems is to protect the hogs from disease, especially hog cholera, which may be carried in the garbage. When Mr. Alvah Brown was in the business, he immunized all his hogs by means of the simultaneous treatment; that is to say, the hogs were inoculated with hog cholera virus and protective serum at the same time. By following this plan he prevented practically all loss through hog cholera, which is the trouble most to be dreaded.

The company which followed Mr. Brown did not treat their pigs at first and met with some very serious losses.

The present company, under Mr. Hartman, will follow either one of two plans: First to give all hogs the simultaneous treatment, or, second, to use serum alone, and vaccinate small pigs at four weeks old, two months old, and at six months old. Mr. Hartman, the manager, has followed the second plan with success in a garbage feeding plant which he operated in another State, though Mr. Brown, who is apparently a very influential member of the company, favours the first method. It is possible that the first method may be used with the breeding sows which are kept on the premises from year to year, and the second method followed on the pigs which are born on the premises. I understand the company proposes to manufacture its own virus and serum. A man can vaccinate from 300 to 400 hogs per day, depending upon conveniences.

Purchased hogs, do not, as a rule, thrive so well upon garbage as those bred from garbage-fed sows, and sows in pig freshly put upon garbage are apt to lose their litters. As a result, every effort is made to breed all the pigs necessary for the feeding operations after a start has once been obtained. This necessitates carrying a large number of sows through from year to year and at least one mature boar for each fifty sows.

The garbage is fed raw. Mr. Brown attempted to cook the garbage when he first started, but he claims he found it decreased the value of the garbage as food, and increased the cost. The company is satisfied, therefore, that it pays better to feed the garbage raw and treat the hogs, as previously described, than to cook the food, as a precaution against cholera. The garbage, as a rule, does not freeze badly in winter and is fed without being thawed or heated in any way. A certain amount of heating occurs in the garbage when it is in bulk in the large cars and this tends to prevent freezing. In summer, Mr. Hartman recommends feeding pigs on the ground, and shifting their location occasionally so that there is no chance for any considerable amount of fermentation of the material on the feeding grounds. In

this manner offensive odours are reduced to a minimum. In winter, the hogs must be fed inside, but with buildings properly constructed there is little difficulty during the cold weather.

Mr. Brown estimates that a carload of garbage will feed 600 hogs of all sizes for three days. On the average, a carload holds about 40 tons, so that, according to his estimate, one ton of garbage would feed 45 hogs one day. An independent estimate of the amount of garbage required for hogs was obtained from Mr. Hartman, whose estimate was that 100 hogs will require on an average, two tons of garbage per day to carry them through from weaning time until finished for market. According to this estimate, one ton of garbage would feed 50 hogs of all ages per day. For hogs weighing in the neighbourhood of 200 pounds, more garbage, of course, would be required, and Mr. Hartman's estimate is one ton of garbage for 33 hogs, each weighing 200 pounds.

Mr. Hartman states that their finished hogs usually command a premium on the market, and that exceptionally good gains are usually made. He claims that he has bought thin hogs at twelve cents per pound and sold them finished at eight cents per pound and still made a good profit on the operation.

Mr. Hartman states that with the amount of stock they have on hand at present they should have six men and two teams to take care of the stock. To carry on a business, such as the one described, requires quite a large investment of capital, but the chances for large profits are good, provided the hogs are handled in a scientific manner. The man in charge must have a full understanding of the business, and must be on the alert to prevent outbreaks of disease, or loss from other sources. As in almost all lines of business, everything depends upon the management.

The present company has been in operation only since January 1st of this year (1917) and, as yet, they have built only one of their main feeding barns, which is 40 feet wide and 240 feet long. There is a driveway through the centre for teams, or through which the cars of garbage may be run if desired, and on each side of this passage-way is a row of pens for stock. A building, such as described, will accommodate 200 cattle, and costs in the neighbourhood of \$7,000.

Quite a number of cities in the United States dispose of their garbage by a method similar to the one described. Arlington, Mass., Lowell, Mass., Fall River, Mass., and Providence, R.I., all dispose of their garbage to private companies, who feed it to live stock.

Messrs. Hooper and Miller, 40th Street Station, Denver, Col., are looked upon as about the oldest and most successful men in this business.

(Sgd.) G. E. DAY

Following is a copy of the agreement between the City of Grand Rapids, Mich., and the party feeding garbage:

MEMORANDUM OF AGREEMENT, between the City of Grand Rapids, and Henry Hartman, of Grand Rapids, Michigan.

THIS AGREEMENT, made and entered into this 2nd day of January, A.D. 1917, by and between the city of Grand Rapids, a municipal corporation of the state of Michigan, party of the first part, and Henry Hartman of the city of Grand Rapids, Michigan, party of the second part:

WHEREAS, the said city of Grand Rapids has determined to undertake on its own account the business of collecting garbage and having collected the same, to secure the sanitary disposal thereof outside the corporate limits of the city and outside of Kent county, and

WHEREAS, the party of the second part proposes to engage in the business of disposing of said garbage in a sanitary manner, such dispositions to be made outside of the corporate limits of said city, and outside of Kent county, therefore, this agreement

WITNESSETH:

1. The said party of the first part hereby agrees to undertake the task of the collection of all garbage in the city of Grand Rapids, as aforesaid, and deliver all of the same so collected daily, or as nearly daily as practicable, Sundays excepted, free in suitable cars to be provided for such purposes by the party of the second part, on the proper railway tracks on the market site in said city of Grand Rapids, as hereinafter provided. It is understood and agreed by and between said parties that the word "garbage" shall be held to include waste or decayed fruit, animal or vegetable matter, liquid or otherwise, which attends the preparation, use, cooking, dealing in, or storing of meat, fish, fowl, fruit or vegetable matter of all kinds; whether from private or public houses or manufacturers, but not ashes, manure or night soil, provided that this definition shall not entitle the company to refuse garbage because some small portion of other matter, or waste material shall be included in the garbage offered to said company by the city.

2. The said party of the first part agrees to collect such garbage so described, so often as may be required by the Board of Health of said city, but not less than twice each week, excepting that from November 15th to March 15th of each year the city need not collect more often than once each week from all places where it renders garbage collection service.

3. The said party of the first part hereby agrees to provide for the use of said second party, four cars of suitable construction and to cause the same to be placed on the proper railway tracks on the market site in said city of Grand Rapids, provided, however, that said second party shall keep said cars in proper repair and return the same to said party of the first part at the expiration of this contract, in as good condition as when received, allowance being made for ordinary depreciation. Provided further, that said party of the second part shall bear any and all transportation expenses and railway charges accruing from the transportation of said garbage from the said railway tracks on said market site, to any point or points of disposal of said garbage, and all railway or other charges arising out of the return of said cars when empty to said market site or place of loading; and that, if at any time, any new railway equipment is needed it shall be furnished by the party of the second part, without cost to the city.

4. It is understood and agreed that the delivery of such garbage to the said party of the second part, shall be made by and under the management of the Board of Health of the city of Grand Rapids, or such branch of the city government as may be provided by charter.

5. It is now expected, unless other point, or points, shall be selected by mutual agreement between the first party and the second party that the delivery of all garbage herein provided for shall be upon the lower part of Island Number Three, below the part, or portion, used for a market site and that all vehicles for such delivery and removal shall be kept in a clean and sanitary condition.

6. The second party hereto agrees to take all deliveries of garbage described as aforesaid, from said first party, or delivered by order of said first party in the cars on the proper railway tracks on the market site as above described, and to cause the same to be hauled out of the city and outside of the county of Kent, on said cars, provided by said second party and to dispose of all of said garbage, outside of the corporate limits of the city of Grand Rapids and outside of Kent county, in a sanitary manner, and to remove the same directly from the city and county as fast as full cars accumulate, Sundays excepted, such removal and disposition to be made by said second party at his own expense and without expense to said party of the first part. Said first party to weigh, supervise and attend all loading of said garbage and delivery to second party.

7. And the said party of the second part agrees to keep said cars hereinbefore provided for, in a clean and sanitary condition, satisfactory to the Board of Health of the city of Grand Rapids.

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8. Said party of the second part agrees to conduct the business of disposing of said substance in a careful manner and to observe any lawful rules and regulations that may be made by any competent authority in reference to the sanitary disposal of such substance, and the work of removing such substances from the city shall be done in a manner satisfactory to the Board of Health of said city.

9. In consideration of the delivery of such substances by the said party of the first part to said second party, said second party hereby agrees to pay to said party of the first part, twenty-five cents per ton, payable on or before the 10th day of each month, during the time that this contract shall be in force.

10. Said party of the second part hereby agrees not to assign, or sublet, this contract unless permitted to do so by the consent of said party of the first part in writing, the approval of the Board of Health of said city having been first obtained. Also, said party of the second part agrees to save the said city harmless from any and all claims for damages or costs on account of failure to fulfil any part of this contract and further, to execute and deliver to said party of the first part a bond in the penal sum of ten thousand dollars, with sufficient surety, or sureties, to be approved by the mayor of said city, for the faithful performance of this contract, such bond to be filed before the execution of this contract and within thirty days from its authorization by the council. One-half of the premium to be paid by the city if bond is furnished by surety company. Provided, however, that said first party shall undertake, at its own expense, either by intervention or otherwise, to join with the second party in the active defense of any and all suits for either temporary or permanent injunction that may be commenced or prosecuted against said second party because of the taking, conveying and disposal by second party of such garbage under the provisions of this contract, or the use of the same by said party of the second part when fed to his own live stock. And second party shall not be held liable to said first party for damages either under this contract or upon the bond therein provided for because of any failure or delay by second party in taking and disposing of said garbage as herein agreed, when said delay is caused by the preliminary injunction of any court of competent jurisdiction restraining said second party, or any of its stockholders, from taking, disposing of, or using said garbage if said injunction is afterward dissolved, whether upon preliminary, or final hearing, before the court, or by stipulation of the parties. This proviso, however, shall not apply to any suit, or proceeding, that may be brought by the first party against second party to enforce, or growing out of this contract. Nor shall this

provision apply in case any injunction proceedings shall be brought restraining said second party or any of its stockholders from violating any lawful rules enacted by the state or any city, village or township.

11. Said first party hereby agrees to diligently prosecute all persons unlawfully collecting, or removing garbage, within said city of Grand Rapids at any and all times, and particularly upon thirty days' notice by said second party to said first party, in writing, of any person unlawfully collecting or removing garbage within said city.

12. Said first party hereby agrees that if the quality or quantity of garbage within said city is at any time during the life of this contract materially reduced by unlawful collection or removal, to proportionately reduce the price per ton of said garbage to be paid by said second party to said first party hereunder, said reduction per ton to continue only during such time as said material reduction in quality, or quantity continues. In case of dispute between the parties hereto it is mutually agreed such dispute shall be adjusted by arbitration, each party to choose one arbitrator, and if such arbitrators cannot agree, then such two to choose a third arbitrator and the findings of a majority of such arbitrators to be binding on the parties hereto.

14. This contract shall go into full force and effect on the first day of June, 1917, and continue in full force and effect for the full term of three years thereafter.

It is understood that this contract is made subject to all terms and conditions of the city charter that may have any bearing upon any of the provisions thereof.

14. This contract shall be binding upon the respective parties hereto and upon their heirs, successors and assigns.

IN WITNESS WHEREOF, the said parties hereto have caused the same to be duly executed.

THE CITY OF GRAND RAPIDS
By Geo. P. Tilma, *Mayor*.

Witnessed by:

Chas. L. Brown,
R. M. Ferguson,
Laura Hannaford.

HENRY HARTMAN

O.K. G. A. Hemple,
Asst. City Attorney.

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GARBAGE COLLECTION RULES

The following rules and regulations relating to collection of garbage and miscellaneous refuse were adopted by the common council of the city of Grand Rapids, Michigan, on the 17th day of June, 1907:

DEFINITIONS—The word garbage, wherever it occurs in these rules, shall be held to mean solids and liquids arising from the cooking, or treatment of vegetables, fruit, fish, meats, or any waste material that would attend the preparation, use, cooking or storing of household provisions.

The term miscellaneous refuse means all rubbish and refuse (other than ashes, garbage, dead animals and night soil) incident to the ordinary conduct of the household. It will be held to include sweepings, paper, waste paper, boxes, but not to include material that may result from the repairs to yards or dwellings, or of other building operations.

Ashes shall be held to mean ashes from coal, or other fuels, and will include other substances such as bottles, broken bottles, broken glass or crockery, and tinware or other broken utensils.

RECEPTACLES—Garbage shall be placed in tight metallic cans having water-proof covers. Cans to be furnished by householder, and scalded once every week.

Garbage and refuse must be kept dry, and must be easily accessible to the collectors. Collectors must be at all times courteous and obliging and must do their collecting in a neat and cleanly manner.

Garbage will be collected by the city teams at least twice each week, for which there will be no charge.

Night soil must be collected by the city, for which the regular charge will be made.

Dead animals will be removed by the city on the proper notice from the householder, for which a reasonable charge will be made.

If any material should be put in the garbage cans other than as specified under the head of garbage, the collectors will refuse to take the contents and same must be disposed of by calling special wagon, for which a fee of twenty-five cents (25 cents) will be charged.

To avoid delay and trouble in collecting your garbage, please observe the above rules.

The above rules and regulations were concurred in by the Board of Health and Poor Commissioners on June 20, 1907, a copy to be placed in the hands of each householder.

The foregoing copy of agreement may not suit conditions in other cities and is given only as a specimen to assist those who may undertake the feeding of garbage under agreement which, however, would be made to suit local conditions.

The Department of Agriculture of the United States has under way a study of the situation with respect to the feeding of city garbage to hogs, including the best methods of handling, the feeding and fattening of stock, the most efficient and sanitary arrangement of equipment, the comparative value of garbage as a hog ration, and the economy of garbage disposal by feeding to hogs compared with systems of disposal by incineration, rendering, dumping, or burying. The investigation will extend to all parts of the United States.

When the information obtained from this investigation becomes available much additional light will, no doubt, be thrown upon the whole subject of converting garbage, which is now wasted, into an edible product.

